M/027/007

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November 24, 1997

Evert Lawton, Ph.D., P.E.
Consulting Geotechnical Engineer
6811 Nye Drive
Salt Lake City, UT 84121

Dear Dr. Lawton:

Subject: Draft Plans of New Heap Pad and Upgrade to Solution Ponds
Jumbo Mining Company, Drum Mine, near Delta, Utah

On October 17, 1997 we received draft plans for a new heap for leaching at the Jumbo Mine facility near Delta, Utah. We have reviewed the plans. The plans propose a triple geomembrane and dual sumps in the ponds. Also, the heap design now has provisions for effective monitoring to replace the need for monitoring wells. The permit limitations of 200 gallons per acre per day (gpad), 0 gpad, and 0 gpad will be the limits for the upper and lower pond sumps, and the heap detection system respectively. These limits are planned to be required by the ground water permit. We have attempted to review the submittal with respect to previous correspondence and all current requirements. We have the following comments:

1. The construction permit for the new heap will be issued with a ground water discharge permit. This permit will require that past environmental problems at the Drum Mine site be addressed before any construction of new facilities is allowed. In particular, the old leach pads for which Jumbo Mining is responsible must be closed in such a way that there is no significant discharge of contaminants to the subsurface. A cap over the leach pads to minimize infiltration will be required unless you can demonstrate that a less-protective design is justified.

2. Please show the proposed height of the ore. Is the slope of the new heap flat enough to keep the pile stable? The typical ore gradation, including maximum size, needs to be provided.

3. The specifications for this work have not been provided. They must provide for the quality assurance and control (QA/QC) testing of various materials per our previous instructions. Please see page 16 of the new draft *Design and Construction Guidance Document for Precious Metals Heap Leach Extraction Facilities* dated February 20, 1997 for assistance.

4. Please provide documentation of normal process flow channel depths for the heap, and include the peak flow from the 25-year, 24-hour storm in the channels. Access the adequacy of the outlet and slopes. Does the southern dike need to be higher due to the approaching fluid velocity head?

5. Daily or continuous electronic monitoring of the solution ponds is required. See our letter of January 30, 1996 regarding electronic and other leak detection required for ponds and pads.

6. On drawing sheet 7 both primary and secondary collection piping mayn't be necessary.

7. Sheet 8, detail 7: The detection drainage material should be insulated from the compacted fill by at least 2-feet horizontally with compacted clay. The detail should indicate this.

8. Please see our letter of May 13, 1992 regarding flood control routing and calculations for the new pad area. Drain down from the heaps to be reclaimed should not be routed into the ponds or new pad. Other precipitation must be routed away from the pad and ponds. It is recommended that ponds have adequate volume to contain normal cumulative precipitation less evaporation, sudden snow melt, and additional allowance for successively close spaced unusual precipitation events.

9. Please review the new draft guidance for design of heap leaching facilities dated February 20, 1997, and include any miscellaneous items essential to conform with the requirements.

There may be other issues regarding ground water permitting which Mr. Novak has addressed which need resolved before issuance of any permit. We request you please respond to the above in writing, incorporating appropriate items into the plans and specifications. If you have any questions, please contact me.

Sincerely,

David A. Rupp, P.E.
Design Evaluation Section

cc: Mr. Ed King, Jumbo Mining Company
Mr. Wayne Hedberg, DOGM
Mr. Ron Teseneer, BLM Fillmore Office

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CHARACTERIZATION SAMPLING PROGRAM

FOR

HEAP LEACH PADS AND WASTE ROCK DUMPS

Located at the

DRUM MINE
MILLARD COUNTY, UTAH

November 1997

Prepared for
Western States Minerals Corporation

Prepared by
E.M. (Buzz) Gerick - V.P. Operations
James Ashton , P.E. - Project Engineer

SCOPE OF WORK:

This program proposes sampling and testing methodologies for representatively characterizing spent heap leach ore and waste rock at the Drum Mine located in sections 7 and 18, T15S, R10W and approximately 35 miles northwest of Delta, Utah in Millard County. To date, there is no regulatory or statistically accepted rule-of-thumb for what is considered ***representative*** sampling of mine waste components. Attempts have been made to formulate sampling criteria, but many site specific factors complicate such formulation including: 1) Lithologic, geochemical and climatic variability; 2) Required test method(s) and intent; 3) Waste component volume, tonnage and physical characteristics.

Once a representative sampling methodology is accepted and samples collected, the characterization results will be evaluated/interpreted and utilized to prepare a final permanent closure plan pertinent to those specific components located at the Drum Mine. Within this program is described the proposed methodology for sampling four (4) inactive spent heap leach pads, one (1) heap leach pad (e.g., LG1) which was never leached and two (2) inactive waste rock dumps; plus an inactive waste dump (designated W7) that one of the inactive spent heap leach pads (designated HG7) is built upon. The proposed laboratory testing of the collected samples relevant to their current status regarding stabilization is also outlined. Map 1 shows the locations of the five heaps and three waste dumps that Western States Minerals Corporation (WSMC) proposes to sample and characterize. Also shown on Map 1 are the proposed sample locations for each component.

The intent of this program is to collect representative samples from which the analytical results will provide characterization and analytical information necessary for the preparation of the following:

(1) Formal closure and final reclamation of these waste components;
(2) Current status of component stabilization;
(3) What additional or alternative stabilization efforts may be considered, if any; and
(4) Future monitoring needs that may be required to demonstrate that ground and surface water(s) will not be degraded.

INTRODUCTION:

The Drum Mine, a conventional open pit and heap leach facility, ceased mining operations in 1985 while leaching continued for some time thereafter. Mine waste components generated at the site during mining activity include three low-grade (LG1 through LG3) and seven high-grade (HG1 through HG7) heap leach pads and four waste rock dumps (W1 - W4), in addition to two open pits and ancillary facilities (e.g., offices, maintenance and process facilities and process ponds). Of the waste components, WSMC has agreed to evaluate and characterize spent ore on four (4) heap leach pads (LG2, LG3, HG6, HG7), three (3) waste rock dumps (W2, W3, and the dump designated W7, located underneath HG7) and a low grade ore stockpile on the heap leach pad LG1, in preparation for final closure and reclamation. Based on visual inspection of the waste components, pit walls and mining records, WSMC believes it is reasonable to assume lithologic and geochemical homogeneity within a given heap or waste rock dump.

It is not clear whether heap rinsing/detox activity(s) occurred following cessation of active leaching. However, it is known that the Department of Water Quality ordered cessation of active leaching in 1990. During the discovery inspection that WSMC representatives made of the site on Sept. 16, 1997; no solution was observed on any of the heaps or liner systems that are designated as WSMC's responsibility. In fact, most of the drainage pipes were disconnected. We suspect that heap drain-down solution is uncommon and typically flows in response to major storm events only. Consequently, heap solution(s) are not likely to be available for collection and analysis. Normally, if heap drain-down solution was available, a sample could be taken and an analysis performed. Then, results of the analysis could be interpreted and a prediction made of what constituents and/or contaminants (i.e., Profile II), if any, might be mobilized from

the spent ore. Since no solution is currently flowing from the heaps, an alternative approach to characterize these facilities is herein proposed.

PROPOSED HEAP ORE SAMPLING:

General: Each heap will be divided up into sections (number of sections depends on heap surface area). Within each section, three (3) sample locations will be marked. The three locations will be determined in a manner as to generate a representative sample for that section. Sample collection will be performed to minimize the introduction of air and/or water which could potentially degrade residual cyanide concentrations, if present. Sampling of the spent ore will be done using an excavator with a maximum reach of 25 feet. WSMC believes this is sufficient to characterize the material which will be pushed off the liner during the subsequent reduction of the slopes to reclamation grades. A cross sectional comparison between the current heap configuration and the proposed final heap configuration (e.g., Figure 1 showing sections A-A' through D-D') show that the deepest cut into the heaps during contouring is 22 feet. Map 2 is an engineered estimate of the final site topography, for those components assessed to WSMC, after reclamation contouring. Figures 1 consists of four (4) cross sections through the heaps showing the original, current and final topographies. Samples (approximately 25 lbs / 5-gal bucket) will be collected in 5 ft. increments from the excavator bucket using a hand shovel. All samples will be carefully sealed, labeled and temporarily stored in a cool, dry location. The samples will then be transported to a selected Nevada certified laboratory for analysis along with appropriate chain of custody form(s).

Individual samples will be opened by laboratory personnel and thoroughly blended by hand; the samples should not be dried beyond their existing moisture content thereby minimizing any cyanide degradation. Individual samples will be cut and quartered. The quartered samples from each five foot interval will be combined to form four (4) representative composite samples for each trench. These composited trench samples will then be composited with the other trenches from the section to form four representative composite samples for each section. For instance: 1) the heap LG3 will be divided into three sections; 2) using a track mounted excavator to collect samples, three test pits will be excavated in each section and samples will be collected on five (5) foot intervals to a depth of twenty-five (25) feet; 3) The samples will be collected using a hand shovel and placed in a five gallon bucket. The bucket will be sealed, labeled and appropriately stored and then transported to a qualified laboratory; 4) Laboratory personnel will blend and quarter each five (5) foot sample. These quartered samples will then be combined with the other five (5) foot samples from a particular trench to create four (4) discrete composite samples per trench. These four (4) composited trench samples will be combined with the other trench samples from that particular section to form four (4) representative samples for each section for analysis by distinct test methods as described hereafter. Map 1 shows the proposed sample locations and heap division lines. Low grade heap number 1 (LG1) will be considered as a waste rock dump, for purposes of sampling and analysis, since no leaching occurred on this component.

PROPOSED WASTE ROCK SAMPLING:

W2, W3, W7 and LG1: Waste rock dumps will also be sampled using an excavator. Based on observations in the field and examination of the pit wall rock, it will be assumed that the waste rock dumps are lithologically and geochemically homogeneous throughout. If during the sampling process this assumption is determined to be invalid then the sampling procedure will be adjusted to take this variability into account. Each excavated test pit will be sampled every five foot in depth. The samples from the entire column will be placed into a single five gallon bucket (approximately 25 pounds). This sample will be considered representative for that particular test pit. Samples will be carefully sealed and labeled, and transported to the selected laboratory. There, laboratory personnel will blend, cut and quarter the samples from each waste rock dump. The resulting composite samples for each waste rock dump will be analyzed by the distinct test method as described below. Map 1 shows the proposed sample locations for the waste rock dumps. High grade heap number seven (HG7) was built on a waste rock dump. This waste rock

dump has been designated as W7 for sampling purposes. WSMC assumes that this waste component will be closed and reclaimed along with HG7.

TESTING METHODS:

General: Spent heap leach ore samples should be analyzed for WAD cyanide and paste pH, Profile II constituents (MWMP - Nevada protocol and SPLP EPA Method 1312) and for their acid generating capability(s) (AGP - ANP). Studies have shown, if material(s) pass the MWMP they are expected to pass the SPLP test.

MWMP: Meteoric Water Mobility Procedure is a test method to determine the capability of specific constituents (NDEP Profile II) to be mobilized from spent ore by "meteoric events". This is a laboratory procedure and not a field simulation so the results cannot be expressly extrapolated to be representative of the internal geochemical dynamics of a given heap. However, it gives a reasonable correlation of what can be expected to occur in the field.

SPLP: The Synthetic Precipitation Leaching Procedure is an Environmental Protection Agency (EPA) test method to determine the mobility of both organic and inorganic analytes present in samples of soils, wastes and wastewaters by "meteoric events".

AGP - ANP: (Acid Generating Potential - Acid Neutralization Potential) This test method incorporates the acid-base accounting of mineral sulfur and carbonate content relevant to acidification / neutralization capability of waste rock.

Permeability / Moisture Content of Spent Heap Ore: Samples will be evaluated relevant to the insitu moisture content and permeability of spent ore. This information is needed to determine the type, if any, of engineered infiltration cover which might be necessary for upper heap surfaces. If the spent ore has the potential to mobilize contaminants, they will have to be contained. Preliminary test results indicate that this is not expected to be a problem. The residual moisture held within the heaps will need to be quantified in order to determine the potential flow from the heaps due to predicted meteoric events.

PROPOSED NATIVE SOIL SAMPLING:

Samples will be collected adjacent to and outside the lined heaps to perform analyses of the natural native soils near the heaps. However, the actual sample locations will be determined in the field, at the time of collection and documented on an "As-built" map. Samples will be composited into one sample for each heap and analyzed using the SPLP test. In addition, the general physical characteristics (i.e., soil type, clay content, porosity and permeability) for each composite will be recorded. The excavator will be used to help collect these native soil samples. The attenuation properties of the Drum native soils may be desired in the future to finalize closure plans. These soil samples will be saved for such testing if needed.